The NASIS Online Help System
Design and Development Process

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Abstract
The online help system for the National Soil Information System (NASIS) release 2.0 was the result of extensive engineering and design work. Starting from a foundation of online information design concepts, requirements were determined and several delivery tools were considered. Problems and solutions from the NASIS 1.0 online help system were identified and a revised information structure developed to address those problems. Individual help system components (topic types) were described and the content and navigational relationships between components determined, resulting in a detailed but generalizable design where both content and behavior are specified in depth.

Keywords
Online help; hypertext; documentation; HyperHelp; UNIX; XWindows; NASIS.

Developing Online Help

The NASIS Online Help System

Overview of Online Help Development

Definitions

Context-sensitive help
An immediate type of online help whose content is determined by the software according to what area of the screen is selected by the user.

HyperHelp
An online help viewer for XWindow system applications.

Hypertext; hypermedia
Information that permits rapid access from one item to another through direct interaction with the information itself. This interaction is typically achieved through activating some form of link, which connects discreet nodes of information.

Jump

A self-contained topic appearing in a full screen by itself.

Online documentation
Online documentation is the total documentation set of the application, presented online. This may include online help, interactive tutorials, and online reference material.

Online help
Online help is a subset of online documentation. Online help is concerned primarily with providing users with small pieces of information needed to complete a specific task rather than extended browsing. Strictly speaking, the NASIS online help system contains reference materials also, but for the purpose of this paper will be referred to as "online help."

Overview; explanative
Information giving an explanation of the underlying mechanisms rather than only a description of them.

Pop-up
A small window that temporarily overlays a help topic and contains a separate, brief help topic.

Procedural
Step-by-step instructions for completing a specific task.

User view
An orientation that takes into account what tasks and goals a user wants to accomplish in using the software, rather than how the software itself is structured.

In the past, online help has been used mostly by experienced users, with the less-experienced user relying on print documentation. Help is now being designed and engineered to support the complete user base and is becoming the primary component of the documentation set.

There are several points to keep in mind when designing online help:

- The primary purpose of online help is to directly support users in accomplishing a task.
- A secondary purpose of help is to support user-directed learning which is independent of task accomplishment.
- Developing online help requires a mix of system analysis and documentation design.
- Online help is NOT print documentation displayed on the screen.
- Online help is NOT "electronic books." These are semi-modular or non-modular documents presented on screen.
- Quality of writing is the single most important factor determining the success of an online help document.

Advantages of online information:

- can serve users at different skill/experience levels

- cheaper to reproduce (no printing costs) and distribute
- avoids delays required by printing
- provides rapid access to information
- can take advantage of unlimited color, graphics, and multimedia
- always available (as opposed to manuals which tend to "walk off" of people's shelves!)
- closes the gap between USING the software and LEARNING ABOUT the software
- can be coded to provide user-controlled non-linear access to information (hypertext)

Inherent weaknesses of the online medium:

- screen holds less text than typical printed page
- limited screen resolution makes reading more difficult
- structure can be difficult for users to apprehend and navigate through
- not well suited for extended reading because of the need for topic modularity
- lacks the familiar tactile qualities of hard copy documentation
- interferes with work screens if help is displayed in full-screen format

To balance the weaknesses against the advantages, an online help delivery system must be able to do the following:

- provide links to other discreet parts of a single document
- provide text formatting capabilities (fonts, bold, paragraph formatting)
- provide a robust search capability
- provide for painless navigation
- provide a printing capability

Before deciding on a delivery tool, careful consideration must be given to the document's design, audience, and purpose. A tool that works well for one type of document may be unsuitable for another.

Also, ask: what is gained by moving information online? To make the exercise worthwhile, the online document should be an improvement over a paper document.

Requirements for an Effective Online Help System

What are the baseline requirements for an effective online help system? An online help system must be, first, good documentation. Beyond that, certain features are required to offset the inherent weaknesses of the online medium and to take advantage of its inherent strengths:

Hypertext links. The true power of online text lies in its ability to be cross-linked, so that information may be accessed in a non-linear fashion. Because a document (or documents) cross-connected by hypertext links can be sampled superficially or in depth, the novice, intermediate, and advanced user can be supported.

Flexible formatting, including character and paragraph. Because text is harder to read from a screen than from a printed page, formatting options are essential. They should include, but not be limited to:

- bold and italic

- different point sizes for heading levels
- hanging paragraph format for lists and procedural steps

Graphics capability. Whenever a large block of narrative text can be "translated" into a graphic, users' cognitive burdens are decreased and satisfaction increased. Particularly useful are overview graphics which give the user a mental schema of the online document's structure. Graphics with imbedded links to other information are extremely desirable for quick access to information.

Ease of navigation, including back, history, and first topic. In all but the smallest online texts, users can become disoriented ("lost in hyperspace"), particularly if the text is richly linked. Users must be able to easily back up one topic, return to the beginning topic (typically the Contents), or to see a history
of their selections.

When browsing a web structure from a central point (linking out to a topic, coming back to a central point; out to another topic, back to the same point), it is also important that users be returned to the same context from which they left to minimize to risk of becoming lost in the document.

Robust search capability. To support the more skilled user, a powerful search facility is necessary to allow quick access to discreet pieces of information. Without the ability to quickly locate a discreet piece of information within the online document, more text must be read, lengthening retrieval time and task
completion time. Users are more likely to give up in frustration and lose confidence in the help system.

Word wrap. Because users can control the size of the window in which the online text appears, the text should automatically wrap to adjust to the window size. Text that must be hard-formatted to preserve line length loses a great deal of formatting flexibility.

Print capability. In asking our users to make the transition to largely online documentation, we should also insure that topics can be printed out for their reference. This has both a practical and a psychological (user acceptance) value.

Other considerations. Outside the realm of the document itself, other factors must be considered:

- cost
- portability
- system overhead
- ease of use/learning curve

Online Help Delivery in a UNIX Environment

Three possibilities were considered for delivering the NASIS 2.0 online help system: an in-house package called "xhelp," developed for the NASIS 1.0 help system; Hypertext Markup Language (HTML) read by the Mosaic browser; and the Microsoft Windows WinHelp facility, ported to UNIX using the commercial software package HyperHelp.

Each tool was assessed in regards to how well it met the previously-identified requirements for online help delivery.

1. In-house package ("xhelp")

For the 1.0 release of NASIS, a public-domain hypertext package, modified for NASIS, called "xhelp" was used.

Assessment

1. Hypertext links: yes
2. Formatting capabilities: minimal. No bold, italic. Larger font available only for topic title.
3. Graphics capability: none.
4. Ease of navigation: provides Previous Topic, First Topic, and History. Relative position within a topic is carried over when making a jump; i.e. if a jump is made from the end of topic A to topic B, the end of topic B appears.
5. Robustness of search capability: will search on keywords (defined hypertext links) only. "Aliases" may be manually entered to provide a fuller keyword list.
6. Word wrap: no. Hard carriage returns required to maintain line length.
7. Printing: no.
8. Cost: programmer's time; built into billing for task.
9. Portability: designed for and operates in the UNIX XWindows environment.
10. System overhead: entire document resides in one file.
11. Ease of use/learning curve: because of its small number of features, easy to learn and use. However, coding of links must be done manually, and an awkward system of "aliases" must be used to specify alternate or non-unique topic names. Documents may be composed in any editor which can support a flat-file format. If the document is created in DOS, it must then be electronically transferred to a UNIX system.

Other comments: overall, this tool was a good way to explore and determine what the needs of the online system were. The lack of formatting was a serious drawback, along with the lack of graphics capability and word wrap. It provided the basic necessities only: hypertext links, good navigation, some search ability. The negligible cost and system overhead was attractive.

Conclusion: not suitable for a large, complex, richly-linked online help document.

2. Hypertext Markup Language (HTML) via Mosaic

(Note: when this assessment was being made, Mosaic was the only graphical browser available.)

Another option considered was to create the online help document using hypertext markup language (HTML) and to display it using the public-domain browser Mosaic.

Assessment

1. Hypertext links: yes. Supports links to other locations within a document, other complete documents, graphics, sounds, and video (with correct viewers configured).

2. Formatting capabilities: provides an attractive interface, including bold and italic, six different heading levels, ordered, unordered, and descriptive lists.

3. Graphics capability: files in gif format can be easily imbedded inline or referred to by hypertext link. Audio and video links are also possible with the correct viewers. Hotspots (imbedded hyperlinks) are possible through the use of image maps.

5. Ease of navigation: because HTML provides a way to selectively sample single large documents, navigation "back" and "forward" send the user to different open documents, rather to locations within the same document. No discreet topics exist unless placed into separate files, so if the referenced topic is fairly short (only a few lines), the next part of the document is displayed on screen as well, whether or not it has anything to do conceptually with the originally referenced topic.

   When topics are split into separate files, forward and backward navigation become simpler. However, no facility exists for preserving the context of a topic when briefer information chunks are desired, such as definitions, forcing the reader to make more backward jumps to return to their place in the document.

7. Robustness of search capability: "non-intelligent" Find capability takes the user to the first occurrence of a specified word. Searches can also be accomplished across multiple documents by way of the Internet.

8. Word wrap: yes. Text adjusts to the selected size of the window. Small windows, however, are mostly occupied by Mosaic's menu bar and buttons.

9. Printing: printing is possible from UNIX Mosaic. However, because an HTML document is recognized only as a single document, not as separate topics, a print request prints the entire document, not just the current topic.

10. Cost: Mosaic is freely available through the Internet and requires no licensing.

11. Portability: an HTML document may be viewed, via the appropriate browser version, on DOS/MSWindows, Macintosh, and UNIX platforms, including UNIX XWindows.

12. System overhead: there is some question regarding what speed, size, and memory are required to run Netscape effectively on an Intel box. On a Sun system running XWindows, there should be no problem.

13. Ease of use/learning curve: several DOS/Windows shareware HTML markup utilities are available through the Internet, including HyperEdit, HTML Writer, and HTML Assistant for MSWord 6.0. For XWindows, the asWedit package is useful. These make the initial markup of a document significantly easier. As with SGML systems, once a basic set of

tags are learned, coding proceeds quickly. Documents may be composed in any type of editor which can save in a flat-file format. Files are then easily loaded and read using Mosaic.

If images (screen captures, diagrams, etc.) are to contain hotspots providing links to other information, an image map must be created. This is a somewhat complex procedure requiring some expertise and appropriate graphics tools.

Other comments: the attractive interface and graphics capabilities were big pluses in HTML/Mosaic's favor. Non-recursive navigation and the inability to represent the document as discreet topics were major drawbacks, however. The cost (free) was very attractive.

Conclusion: a promising tool for types of documents that lend themselves to "curious exploration," probably for the advanced user who is interested taking the time to browse a large document, or for a more linear (front to back) access of technical documentation. The inability to preserve context for in-line definitions and other brief information chunks is a significant problem for procedural-oriented text. This approach could potentially work well for already existing hardcopy texts, which could be more easily "dumped" online, but is not acceptable for true online help documentation.

3. Microsoft Windows WinHelp facility

A third option considered was the WinHelp facility bundled with Microsoft Windows, compiled to be viewable in XWindows by a commercial software package (Bristol Technology's "HyperHelp").

Assessment

1. Hypertext links: yes. Allows links to other, discreet topics, pop-up windows, and graphics.

2. Formatting capabilities: all the formatting capabilities of MSWord for Windows are available, including bold, italic, and a variety of fonts and sizes. Style sheets may be attached, as to any MSWord document, so formatting possibilities are many and easily customized.

3. Graphics capability: files in many different graphics formats (including .pcx, TIFF, bitmap, HP graphics, Lotus, and Auto CAD) can be easily imbedded inline or referred to by hypertext link. Graphics themselves may be edited to include "hotspot" hyperlinks.

4. Ease of navigation: a complete navigation system is provided, including Back, History, and Contents. In addition, "browse sequences" may be coded into the document, providing easy navigation along preferred paths of information.

5. Robustness of search capability: a full-featured "intelligent" search engine is provided. In addition to searching on coded hypertext keywords, alternate topic keywords can be imbedded by the document's author, creating a fuller and more intuitive list of searchable terms. A string search ("Find") feature is also available.

6. Word wrap: yes. Text adjusts to the selected size of the window.

7. Printing: requires additional programming to create PostScript-compatible print ability. If this is in place, individual help topics can be printed, in their formatted form.

8. Cost: WinHelp itself is freely available within any copy of MSWindows. To make the document portable to UNIX, a commercial software package must be used, at an approximate cost of $5000.00 for a compiler and a browser. The browser, once purchased, may be freely distributed to all users, however.

9. Portability: works in MSWindows, can be ported to UNIX, including the XWindows environment.

10. System overhead: under evaluation.

11. Ease of use/learning curve: a powerful, full-featured system which is nevertheless easy to learn and use. Templates, editors, and a wide variety of other development tools are readily available to assist in document composition, coding, and debugging, some as shareware (Winhelp3, Create_Help, the Shed Hotspot graphics editor), and some as commercial products (such as ForeHelp, Doc2Help). Documents may be composed using the standard MSWord for Windows package or any other package which can save files in RTF (Rich-Text Format).

Other comments: WinHelp is a powerful and full-featured online help authoring tool. A great deal of information is available on how to use WinHelp to its fullest potential. WinHelp is also a proven industry standard with a high level of user familiarity, acceptance, and satisfaction. This point is more important than it might appear: "If you follow standard interface guidelines the vast majority of your users will easily 'look through' your interface and concentrate on what's important -- the information your document presents (Lynch 1994)." The cost of the porting software is a drawback, however.

Conclusion: the only drawback to this approach is the cost of porting WinHelp documents to UNIX. But from the point of view of the overall communication process, of the three options presented, WinHelp clearly most fully met the criteria established for this project (see Requirements for an Effective Online Help System).

The NASIS Online Help System: History

Project, Tools, and Platform

NASIS (the National Soil Information System) is a new system for managing soil survey mapunit data. Version 1.0, released in October 1994, and version 2.0, released in October 1995, both run in the UNIX XWindow system environment. Because of the flexibility afforded by this graphical interface, user documentation was designed to be presented primarily online, in the form of a help system and online tutorial.

The online help system for NASIS 1.0 was developed using an in-house package called "xhelp" (see next section). The online help system for NASIS 2.0 was developed using Bristol Technology's HyperHelp compiler and viewer; the viewer is distributed with the NASIS software. NASIS and the online help system run on Sun SPARC stations running SunOS and XWindows.

NASIS 1.0

The majority of the NASIS 1.0 documentation was contained in an online hypertext help system. This help system was delivered via a tool called "xhelp," which was adapted by the NASIS development team from a public-domain hypertext package.

NASIS 1.0 online help was accessed through the NASIS Help menu. The major help subtopics were:

Contents
This selection displayed a list of the major subtopics of the system. To access any of the topics, the user moved the mouse pointer to that topic name and clicked.

On Context
When selected, converted the mouse pointer to a ? pointer. The user could then click this pointer on the window element about which they wished to see more information (e.g. data element, button, window).

On Help
This selection displayed a sub-menu of information about the NASIS 1.0 online help system.

On Window
This selection displayed help for the current window, giving a summary of the window's functions and providing links to related instructions and topics.

On Keys
This selection displayed information about keys and keystroke combinations that could be used in NASIS 1.0.

On Procedures
This selection displayed a listing of procedural help topics; for example, Editing Data Mapunits. This information was used to find out how to accomplish a specific task in NASIS 1.0.

On Commands
This selection displayed a list of NASIS 1.0 menus and commands. This information was used to find out what each menu selection did, what shortcut keys existed, and to see other options, notes, or cautions associated with the command.

NASIS Overview
This selection displayed general information about the NASIS 1.0 application and a list of the tasks that could be accomplished using NASIS 1.0.

On Version
This selection displayed the application's name and version number.

Index
This selection displayed a list of subjects covered in the NASIS 1.0 online help system.

When the help system was displayed, hypertext links (keywords) appeared in green. These keywords linked the current topic to more information, instructions, or definitions, allowing users to explore topics in the detail they required. Navigation aids within the help system included a Contents button, a Back
button, a History button, and an Index button.

The text for the help system was created and maintained in a single ASCII text file. This file could be modified using a text editor or word processor. Individual topics within the file were delimited by ".help" tags; keywords were set off with "@" symbols.

Results and Problems
After the release of NASIS 1.0, some time was devoted to assessing the success of the online help system through direct user observation (during beta testing phases) and additional in-house testing. Though users reported a good level of satisfaction and appreciated the potential of an online, hypertext help system, the following specific problems were identified. Solutions to these problems served as a basis for re-designing the help system for NASIS release 2.0.

1. **The information in help system was not organized in a user-oriented way.**
   In NASIS 1.0, the organization of help system reflected how NASIS works, rather than how the users might think of the information. For NASIS 2.0 the intent was to develop an organization scheme which more closely matches how the information is conceptualized by the user.

2. **The underlying structural paradigm of help system was not readily apparent to the users.**
   Users sometimes had difficulty finding information in the NASIS 1.0 online help system because the structure of the help system was not readily apparent to them. A major goal for the NASIS 2.0 online help system was to create a simplified structure that would give users a better idea of where to find specific kinds of information, primarily by limiting the initial points of entry and making those points more intuitive. This was intended to reduce the frequency of incorrect or inappropriate choices when searching for specific information.

3. **A "layer" of information was missing.**
   Information in the NASIS 1.0 online help system was presented at a high (overview) level and at a specific task (procedural) level with little explicit connecting information provided. An intermediate level of comprehensive material was needed to relate the high-level concepts to the actual step-by-step procedures.

4. **Context-sensitive help was not specific enough or did not provide additional information beyond what was already known.**
   The context-sensitive help provided by the NASIS 1.0 online help system (especially help for data elements) did not provide users with in-depth information required to make decisions about completing tasks. Another goal for the NASIS 2.0 online help system was to enhance the context-sensitive help to provide information on interrelationships between data elements, options, impacts, and other relevant usage information.

The NASIS Online Help System: Structure

With the adoption of a new, much more flexible and powerful tool to deliver the online help, the problems arising in the first release of the NASIS online help could be addressed at more than a superficial level. Problems with information access were number one on the list of issues to solve with the second release of NASIS.

Remediating the access problem

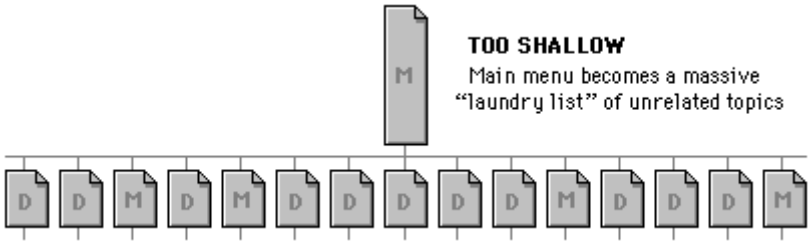
Even with smaller hypermedia information systems, problems with navigation can arise. Typical problems include:

- getting lost in the information;
- having difficulty gaining an overview of the material;
- not being able to find information that the user knows exists;
- knowing what information does exist; and
- knowing how much information has been viewed and how much still remains.

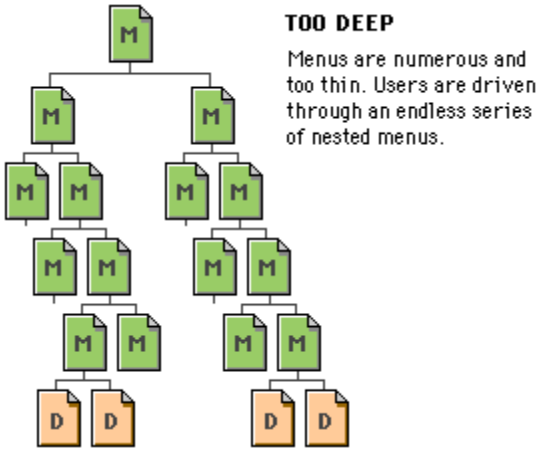
(Davies, Maurer, and Preece, 1991.)

Solutions to these types of problems can be found in two main areas: *reducing complexity*, and *capitalizing on the users' prior knowledge*.

The primary issue in the design of the NASIS 2.0 online help system was to reduce the level of uncertainty users faced when trying to find information in the version 1.0 help system. Although the initial entry levels of the version 1.0 help were suggested by Motif style standards, it was found in practice that these levels were too numerous and did not adequately suggest the content they contained. In fact, it seemed that the structure of the NASIS 1.0 online help system was too shallow -- that is, too many choices located at the top (main menu) level:



In reconsidering the structure of the online help, we wanted to avoid the other extreme; that is, an organization that was too deep:



The identified ideal was to have no topic more than three "clicks" away from the help system's table of contents. This was achieved by creating an initial organizer topic (Table of Contents) that was reduced in complexity from the NASIS 1.0 help system's Table of Contents.

The initial re-design paradigm was based on three entry points, each corresponding to a level of user expertise (novice, intermediate, and expert). This way, a user would not have to choose between too many information categories, and could be explicitly directed to the category that best suited their self-assessed skill level.

It was hoped that this would also address another issue, that of the system-oriented organization of the version 1.0 help system. The Motif-suggested categories -- "On Keys, On Window," etc. -- seemed to describe the system's functions, rather than how the information might be conceptualized by the user. The new suggested categories were:

Guided Tour: designed for the new NASIS user. This section would contain "front matter" (conceptual information), arranged in a linear, progressive sequence via browse sequences and maps. The Guided Tour would contain the following kinds of information:

- Getting around the online documentation ("Where do I find...?)
- Conceptual structure of NASIS: new concepts
- Windows and window management
- Manipulating the NASIS interface
- Working with NASIS data

General Index: designed for the intermediate user; i.e. someone who has an idea of what information is needed, but who also might want to do some exploring. The General Index would be a list of all topics in the help system, both procedural and referential, arranged alphabetically.

How to... and Commands Index: for the expert user. These topics would contain very explicit, specific, discreet pieces of information in a strictly modular form, with browse sequences built into related tasks.

Another class of information, access from outside the help system proper, would be context-sensitive help. All topics in the help system would be cross-linked as appropriate, across the boundaries of the basic categories.

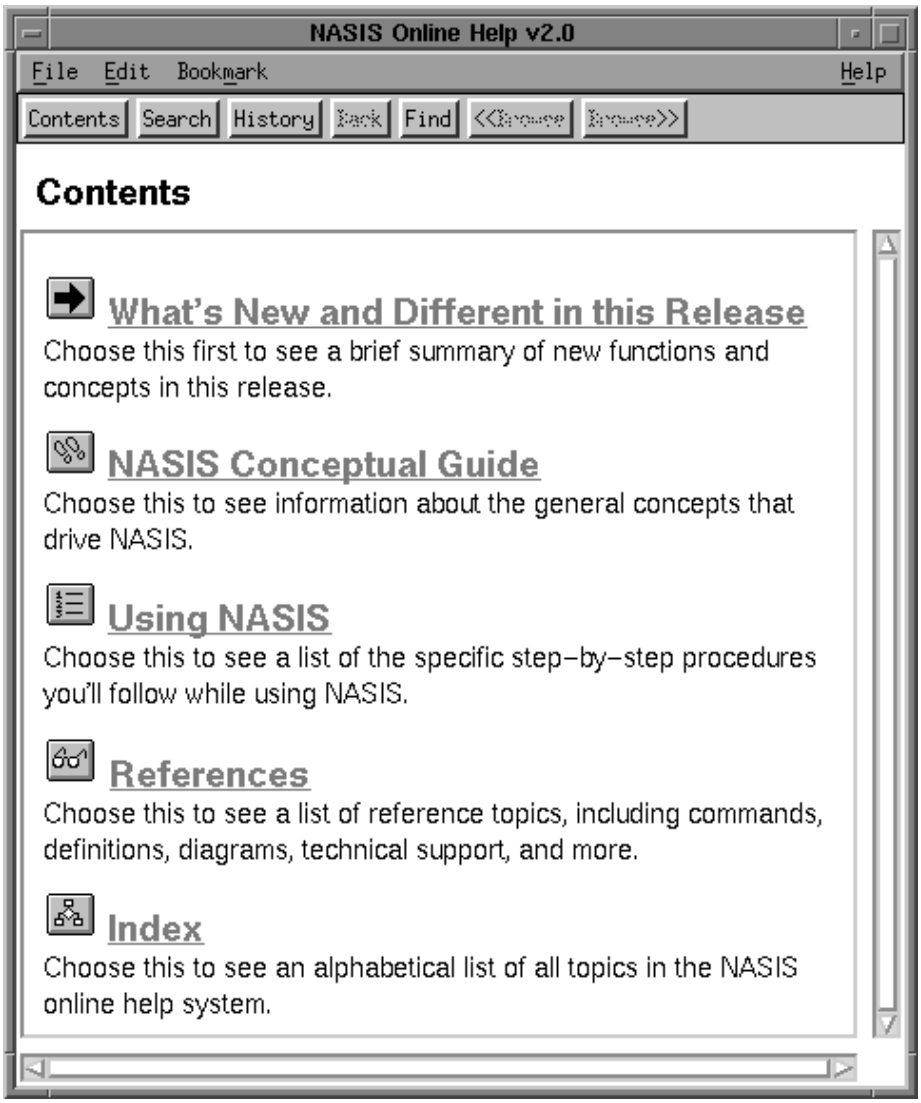
The structure underwent considerable review and revision within the design team, consisting of Terry Burton, Kelly Dodge, and Russ Kelsea. This revision continued at some levels until shortly before the release of version 2.0, but the general framework was substantially in place before much content development was done.

Though we wanted a structure that limited the number of possible access points to the information, we soon discovered that the suggested three entry points were too few to encompass all types of information needed to support NASIS. The biggest initial change was to break out procedural information and reference information. Though we anticipated that both procedures and references would be accessed more often by experienced uses, there simply was too much to be covered under the single umbrella of the "How to... and Commands Index."

Later in the process we also decided to break out information about changes and additions contained in the second release of NASIS. Originally, this topic was meant to be part of the front matter (now called the "NASIS Conceptual Guide"). However, it was decided that this information was too important to "bury," and so it was floated up to a level by itself in the main help organizer topic (aka "Contents) and appears as "What's New and Different in this Release."

Another question concerned the very basic information about using the XWindow interface. We didn't want to discard this information entirely, but also felt comfortable assuming that users of NASIS 2.0 were likely to have already been exposed to it. Therefor a topic called "If you're new..." was created, to be accessed only through the NASIS help pull-down menu. In this way the information was still available, but outside the main stream of help topics.

The NASIS 2.0 online help system was released in October 1995. Its final structure can be seen through the topics appearing in the Contents. Note that users are told explicitly under what circumstances to search that section for information. This structure can also be interpreted as a "textbook" metaphor; that is, with introductory material first, instructions next, and references and an index at the end. In this way the design hopes to capitalize on users' prior knowledge of how this type of information works, helping them to more easily create a mental model or picture of the online help system as a whole.



The NASIS Online Help System: Components

The NASIS 2.0 online help system as designed consists of *functions* and *elements* (see the Content and Navigation Matrix for a full description of all functions and elements).

Functions

Functions are available through the HyperHelp viewer's menu bar and button bar. Functions are divided into two categories:

- Those providing absolute navigation (forward, back, top) without regard to content.
- Those providing utilities such as History, Search, Find, Annotate, Copy, and Bookmark.

Most functions and their behavior are defined by the help viewer.

Elements

Elements are the actual information types within the NASIS 2.0 online help system. Elements are defined by purpose, required and optional sub-elements, and link rules that define their navigational relationships to other elements.

These defined elements have been further classified as belonging to one of four different groups:

- Overview
- Procedure
- Reference
- Training

It should be stressed that these distinctions are made for the sake of maintaining design clarity during creation and subsequent iterations of the online help system. The outcome will be a help system with predictable appearance and behavior among all topics, not one where the user need be aware of what class of topic is being viewed. Topics within all four classes are thoroughly inter-linked, providing users with access to all pertinent related information.

Overview. These elements are characterized by containing more or less extended narrative text with no explicit procedures (numbered steps). They are intended to provide high-level information about the application as a whole, its functional areas, and structure; also to provide general information about the business area in relation to the application or about a group of related procedural tasks.

Much greater emphasis was placed on overview topics in the version 2.0 online help system, in response to problems identified with the first version. Not only was such explanative material presented in a sort of "front matter" or application overview form, but also in "procedural overview" topics intended to explain a narrower set of concepts related to a specific procedure.

This greater emphasis on explanative or overview topics is vital for a documentation system meant to support a product such as NASIS, which requires its users to adopt not only new software and interface knowledge and skills, but also to create a different mental model of their business area and task flow. To use NASIS efficiently, users must not only solve problems but be able to identify and formulate problems in this new conceptual environment. Mayer's (1985) work demonstrated that readers who could better recall explanative text were better able to then use the information in a problem-solving context. This approach can be contrasted with a more minimalist manual philosophy, better suited to users who do not need or seek any deeper understanding of the procedure and desire only "how-to" knowledge (Wright, 1995).

Procedure. These elements contain step-by-step explanations with a minimum of explanatory narrative text. They are intended to show how the application works and how to use it to complete user-defined tasks.

Reference. These elements also contain narrative text, but unlike the overview classification are intended to provide specific and discreet information that requires virtually no explanation. A reference element is usually terse, often taking the form of listed, tabular, or graphical information.

Training. These elements are intended to provide scenario-based software demonstration and instruction. These elements are both narrative and procedural and are graphic-intensive.

NASIS Online Help System Design: Content and Navigation Matrix

The following tables contain the matrix used to determine content and navigation (link) behavior for NASIS online help elements (topic types) and functions (built-in navigation and utility features). Navigation among topics within the NASIS online help system occurs by means of *jumps*, *pop-ups*, and *secondary windows*. This matrix was also used extensively during the review process to check individual help topics' adherence to the design.

Jump
A self-contained topic appearing in a full screen by itself.

Pop-up
A small window that temporarily overlays a help topic and contains a separate, brief help topic.

Secondary window
A window that appears as a separate process.

Element Definitions

P = procedural element
O = overview element
R = reference element
T = training element

The * indicates a required element. See <A HREF="comp.htm">Components</A> for a complete explanation of these elements.

Elements		
Procedure (P) Provides step-by-step instructions for completing an application function. Intended to explain how the application works and how to use it to complete user-defined tasks. Procedures could be (but need not be) categorized as primary, prerequisite, and related procedures.	topic title* prerequisites/requirements* body of procedure* related topics list	procedure application overview procedural overview* data element explana table descriptions answers to common example screen with hints and shortcuts menu commands keyboard guide database structure di definitions external references readme topic

Application overview (O) Provides high-level information about the application as a whole, its functional areas, and structure; also provides general information about the business area in relation to the applicaton or about a group of related procedural tasks.	topic title* background or overview narrative* graphic related topics list	procedures application overview what's new and differ comparison to other a table descriptions answers to common menu commands keyboard guide screen diagram database structure di definitions readme topic lessons
Procedural overview (O) Provides brief, specific overview information about a specific procedure. Intended to give users an understanding of general concepts or rules associated with the procedure.	topic title* background or overview narrative* .	definitions
What's new and different in this release(O) Provides brief information about new features in the current release. Intended to give an overview of new functionality and to provide comparisons to the previous release.	topic title* overview information* comparison of new functionality or application features to previous release, as appropriate*	Conceptual guide org definitions
Comparison to other applications (O) Provides information about data elements and terminology that may differ between the software and other applications. Intended to help users of other applications transition to the current application.	topic title* comparison of functionality, terminology, and data elements*	application overview procedural overview what's new and differ table descriptions menu commands keyboard guide screen diagrams definitions

If you are new... (T) Provides graphic of application's interface. Intended to familiarize users with the major functional components of the application's (including online help) interface.	Topic title* Representative graphic of application's interface with explanatory information*	none*
Table explanations (R) Provides general information about application's data structure and tables. Intended to give users a broad understanding of the major components of the system and how they relate.	topic title* explanatory text (why its important, how used, and aggregrate assumptions) for specific data structure/table*	application overview procedural overview what's new and differ comparison to other a answers to common screen diagram database structure di definitions
Answers to common questions (R) Provides answers to anticipated general questions about the business area. Intended to be a resource for troubleshooting and to provide the user with back ground on the application via a Q & A format.	topic title* business area-related questions and answers*	application overview definitions
Technical support options (R) Provides direction on how to obtain support when a problem is encountered. Gives the range of support options, including online help, printed documentation, readme files, answers to common questions, troubleshooting, error messages, and finally, phone support.	topic title* list of support resources and under what conditions they could be used*	answers to common definitions error messages readme topic what's new and differ lessons If you're new Using online help Online help Search a functions

Data element explanation (R) Provides very specific information about a data element in relation to its context in the current table or screen.	label name* unit of measure, if applicable* narrative explanations to the following:* 1)What does the data element mean, particularly in the context of the given table (or screen)? 2)Why is the entry important? 3)How is the data to be used? 4)What does the user need to know to decide what entry to make? 5)What is the effect of entering the data? 6)Does the entry affect any other data, and if so, how? 7)Is an example needed in the data element explanation? 8) If different, how does this compare to previous release or other application? List of choices, if applicable*	ODD definitions* definitions choice list items external references
Example screen with data (R) Provides a screen graphic filled in with sample data illustrating a specific procedure. Intended to further explain and demonstrate application functions.	topic title* graphic of screen with appropriate example data* short explanation of screen*	procedure definitions
Official data dictionary definitions (R) Provides official ODD definitions for individual data elements. Intended to give users very specific and limited information about data elements.	logical name* official data dictionary information*	definitions*
Hints and shortcuts (R) Provides a short text (with no impact on data) related to a single step within a procedural topic. A reminder or hint intended to make the task/procedure easier or faster.	terse information related to a single step within a procedural topic*	none*

Note (R) Brief text explaning actions that have minor impacts on data. Intended to increase understanding of functions or options.	terse information related to a single step within a procedural topic*	none*
Caution (R) Brief text explaining actions that may have major impacts on data. Intended to increase understanding of functions or options.	terse information related to a single step within a procedural topic*	none*
Index (R) Contains all topics and defined terms in the help system. Intended to give users an easy and familiar way to locate information.	topic title* alphabetical list of all topics and defined terms in the help system* "See also"s as appropriate*	procedures* application overview* procedural overview* what's new and differ comparison to other a data element explana table descriptions* answers to common when you have a que example screens with ODD definitions* hints and shortcuts* menu commands* keyboard guide* screen diagrams* database structure di definitions* error messages readme topic* lessons*
Menu commands (R) Provides information about commands accessed through application's menus and tool bar. Intended to give complete information about using a command.	topic title* shortcut keys/buttons* options* cautions or warnings*	procedures application overview procedural overview keyboard guide screen diagram definitions lessons

Keyboard guide (R) Provides information on keyboard actions for text editing, navigation, and other mouse actions. Intended to give users an understanding of how the keyboard functions in the application.	topic title* description of keyboard actions*	procedures application overview procedural overview what's new and differ comparison to other a menu commands screen diagrams definitions
Screen diagram (R) Provides graphic of application's interface. Intended to familiarize users with the major functional components of the application's interface.	topic title* representative graphic of application's interface with imbedded links to explanatory information*	procedures application overview procedural overview what's new and differ comparison to other a menu commands keyboard guide screen diagram definitions lessons
Database structure diagrams (R) Provides a graphic of the application's database structure. Intended to give the user a broad overview of the application's data structure.	topic title* graphic of database structure with imbedded links*	procedures application overview procedural overview what's new and differ comparison to other a table descriptions database structure di definitions lessons
External References (R) Cross-references to electronic or hard-copy external references. Could be policies and procedures governing the business area, *Getting Started* manual, or other applications.		none
Internal References (R) Detailed information specific to the application, including rules for use of the system and examples of specific capabilities or functions.		definitions procedures application overviews internal references

Definitions (R) Provides definitions of important terms within the application.	term* term definition*	definitions
Error messages (R) Provides an alphabetical listing of specific error conditions within the application.	topic title* alphbetical list of error messages and explanations*	none
Readme topic (R) Contains last-minute information, errata, etc. not included in other documentation.	narrative information as appropriate*	none
Lessons (T) Tutorial lessons intended to train users to use the application. (Selecting Lessons begins a separate (secondary) help process with an indepedent display.)	topic title* lesson, including graphics*	definitions next lesson
Demonstration (T) An online slide show intended to introduce new users to main application concepts.		
Functions		
Application Help menu (N) Provides access to online help via the application's main menu. Contains Motif-required items and application-specific items.	List of menu items*	top level topic* index find context-sensitive help version* If you're new lessons
Top Level Topic (N) Designated top of help system (first organizer topic in the help system).	A list of the help system's most general, top-level help topics.*	overview procedure reference training index

Search (U) Provides access to specific topics in help system via keyword or string search (depending on implementation). Displays Search dialog. Context in help window is retained.		
Find (U)		
History (U) Displays History dialog. Context is retained.		
Back (N) Displays the immediately-previously-viewed topic. Context is retained.		
Browse (forward and back) (N) Moves forward and back in a sequence of defined related topics.		
Copy (U) Displays Copy dialog. Context is retained.		
Annotate (U) Displays Annotate dialog. Context is retained.		
Define Bookmark (U) Displays Define dialog. Context is retained.		
Help menu within Help (U) Displays a secondary window providing access to information about using the help viewer.	information on help viewer version* information on how to use help*	help on help* about help*

Dialog help (N) Provides access to help topics from the help button on message, warning and error dialogs as well as all other dialog boxes used by the application.		procedure error messages
Shft+F1 Context-sensitive (N) Provides access to help topics that are keyed to a specific, discreet part of the application, such as data elements and screen regions.		data element explana table explanation definition
Links		
Jump (B) A self-contained topic appearing in a full screen by itself.		
Pop-up (B) A small window that temporarily overlays a help topic and contains a separate, brief help topic.		
Secondary window (B)		
Secondary process and window (B)		

(B) Behavior
(N) Navigation
(O) Overview
(P) Procedure
(R) Reference
(T) Training
(U) Utility

Conclusions

NASIS 2.0

The primary goal of the NASIS 2.0 online help system design process was to create an end product that would support the user in completing soil survey tasks using the NASIS software. This help system needed to be comprehensive, flexible, and accessible.

Building on the experiences gained through the development of the NASIS 1.0 online help system, much progress was made toward meeting this goal. A greatly improved delivery tool was a first and major step taken in this development process, followed by detailed attention to the structure of the information. Information components (topic types) and their behaviors and relationships were worked out through many iterations, using topics created to address NASIS 2.0's new functionality as test cases to exercise the new design. The release version of the NASIS 2.0 online help can be viewed as a finished prototype, awaiting further testing by users in the field during this next year.

A secondary purpose of this process was to create a generalizable design for online help systems operating in the XWindows environment. This design was intended to be explicit and as complete as possible without being constrained by specific content. To that end, the design process emphasized the interface requirements and solutions, not content; the delivery of the information rather than the information itself. It is hoped that this work and the record of the process and outcome will be of use to other projects considering online help development for graphical UNIX applications.

"Every document emerges into a different history and attracts a readership different from all that have gone before. Document design ... must therefore be a continuous process, a problem that remains to be solved with every new document or communication (Killingsworth, 1995)."

Areas for further research and development

Perhaps the biggest difference between expert and non-expert users of computer system is the ability to develop a mental model of the system (Mayer, 1988). In online documentation, graphics play an important role in helping users develop these mental models.

In the NASIS 2.0 online help system, graphics were used moderately, mostly to provide examples. More extensive overview graphics were not used, with the important exception of a database structure diagram which contained links to table definitions. Other graphics could be helpful in providing users with a general picture or model of the concepts in NASIS, as well as the structure of tables and even of the information in the online help system itself. The development of such graphics is a specialized field in itself, and merits further consideration for future online help systems.

Now that the NASIS 2.0 prototype has been released, additional testing and evaluation also needs to be done among the end user population. Test instruments, such as questionnaires and evaluations, should be developed and distributed to users and feedback obtained. Evaluations should focus on:

- information representation
- access
- format
- content
- comprehension
- navigation
- link to application

An interactive tutorial is under consideration for the third release of NASIS. Interactive elements, such as dynamic charts and graphs, audio, and video, may be useful in the online help system as well.

"The onus for achieving successful communication cannot be safely left to the reader. Writers need to see themselves as catalysts for the strategies their readers adopt; and they need to be aware of the design features that promote the selection of particular strategies (Wright, 1995)."

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